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II/3

Crystal growth of solvothermally obtained $LiFePO_4$ in dependence of synthesis conditions

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Olivine type $LiFePO_4$ is a promising cathode material for the use in lithium ion batteries, especially in the batteries for hybrid electric vehicles or pure electric vehicles. In this work, $LiFePO_4$ was synthesized by solvothermal method at 180°C, for 15 hours. The n-hexanol was used as a solvent with cyclohexane and Triton X-100 as co-solvent and surfactant, respectively. The powders were annealed at elevated temperatures with addition of oxalic acid as carbon source. The conditions of solvothermal synthesis and the presence of the oxalic acid played important role in the crystal growth mechanism. Powders were characterized by X-ray diffraction, scanning electron microscopy and galvanostatic charge-discharge cycling.

II/4

The synthesis of tungsten trioxide gel by dissolution of tungsten in hydrogen peroxide and its transformations during the heat treatment in oxidation and reduction atmospheres

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Tungsten trioxide has a wide spectrum of applications in optical and electrochromic devices, gas sensors, solar energy conversion, etc, and may be reduced to metallic state by heating in hydrogen atmosphere, which offers a new field of application. A suitable precursor for nanodispersed oxide and oxide films of nanometer thickness may be obtained by dissolving metallic tungsten in hydrogen peroxide. In this work such a solution was obtained, and dried to a state of transparent gel, by heating in air at 60°C. The gel was evidenced to be amorphous by means of X-ray diffractometry. By thermogravimetry it was determined that the molar ratio of H_2O against WO_3 in the gel was 1.5 : 1, and that on heating it at a rate 15°C min^{-1} water removal occurs up to 400°C. The X-ray diffractometry evidenced that the obtained product presents monoclinic WO_3. Both of these oxide forms were heated in a TGA device in reduction hydrogen atmosphere, and it was observed that the reduction of both amorphous and crystalline sample proceeded at almost equal temperatures. The morphology and granulation of obtained metallic powders were studied by means of scanning electron microscope.